ABSTRACT OF THE DISCLOSURE

A profiler or scanning probe microscope may be scanned across a sample surface with a distance between them controlled to allow the sensing tip to contact the surface intermittently in order to find and measure features of interest. The distance is controlled so that when the sensing tip is raised or lowered to touch the sample surface, there is no lateral relative motion between the tip and the sample. This prevents tip damage. Prior knowledge of the height distribution of the sample surface may be provided or measured and used for positioning the sensing tip initially or in controlling the separation to avoid lateral contact between the tip and the sample. The process may also be performed in two parts: a fast find mode to find the features and a subsequent measurement mode to measure the features. A quick step mode may also be performed by choosing steps of lateral relative motion to be smaller than 100 nanometers to reduce probability of tip damage. In this mode, after each vertical step to increase the separation between the tip and the sample, it is detected as to whether the tip and the sample are in contact. If they are still in contact after the vertical step, one or more vertical steps are taken to increase the separation, and no vertical step to reduce the separation is taken and no lateral relative motion is caused until it is determined that the tip and the sample are no longer in contact.